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Implementation of Enhanced Energy Buffer Aware Reliable Routing Protocol in MANETS

[1*]Murali G, [2]Apoorva M Swami, [3]Kruthika Kadam G, [4]Kusuma G, [5]Mandakini A Katwey

[1,2,3,4,5]Dept. of Information Science and Engineering, SJB Institute of Technology, Bangalore, India

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***Abstract*:** Mobile ad hoc networks (MANET) are one of the most significant emerging research areas in wireless communication. Nodes in MANET undergo continuous self-configuration where power awareness is an essential issue to improve the communication for all the nodes. MANET nodes are miniature devices with limited energy, transmission range, memory and computational power. The energy efficient routing is one of the most important design criteria for MANETS, since mobile nodes will be powered by batteries with limited capacities. Power failure of a mobile node not only affects the node itself but also its ability to forward packets on behalf of others and thus affects the overall network life-time. Due to this, we propose a novel protocol called ENHANCED ENERGY BUFFER AWARE RELIABLE ROUTING (EEBARR) in WSN with more number of nodes to transmit the packets from source to destination. It improves the packet transmission, balances the energy and uses buffer management policy to mitigate packet losses and analyze the performance using the parameters like Energy consumption, Throughput, Packet delivery ratio, End to End delay and Reliability.

***Keywords*: MANET, WANET**

I. INTRODUCTION

An ad-hoc network is a local area network (LAN) that is built spontaneously as devices connect. Instead of relying on a base station to coordinate the flow of messages to each node in the network, the individual network nodes forward packets to and from each other.

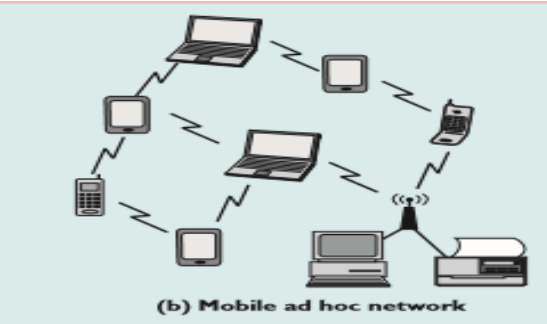

Figure 1: Mobile Ad-Hoc Network

Types of ad-hoc networks
There are two types of ad-hoc networks.
A Wireless AdHoc Network [WANET]: A wireless ad hoc network (WANET) is a decentralized type of wireless network. The network is ad hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding the data and is made dynamically on the basis of network connectivity.

A Mobile AdHoc Network [MANET]: MANET is an ad hoc network which does not require any infrastructure support for carrying data packets between two nodes. It is a continuous self-ordered, infrastructure-less network of mobile devices connected wirelessly. It possess a flat network infrastructure. It has a shared medium which is highly demandable for radio communication.

In MANET architecture, every computer or node means any device is a router as well as end host. MANET has a dynamic topology architecture which highly promotes mobility.

II. RELATED WORKS

Wireless networks are established in two variant modes either in infrastructure mode or in Ad hoc mode. In infrastructure mode, data transmission is achieved with the help of centralized device. Ad hoc mode works in decentralized manner. In paper [1] it has been analyzed that data transmission depends on the distance between two nodes as well as on environmental condition.

In paper [2] the aim is to minimize the overall consumption of battery so that life time of the network can be increased.

The Mobile nodes in MANET are completely dependent on the power of energy of mobile nodes. The energy or battery power of nodes is limited due to that efficient consumption is needed to improve the lifetime of nodes and network. The main aim of this paper is to increase the energy efficiency and the network connectivity simultaneously.

In paper [3], the proposed algorithm always selects the neighbor nodes having highest energy among all neighbor nodes. In order to enhance the lifetime of MANET, energy efficient techniques are required. In this paper, an Energy Efficient Routing Protocol EERP is proposed for this purpose which is based on AODV.

In paper [5], Network Connectivity based Energy Efficient Topology Control Scheme is developed that focuses on both network connectivity and energy consumption and introduced the Energy Efficient Topology Control Approach to make the correct balance between the energy efficiency and network connectivity.

The main motivation of paper [6] is to overcome the problem of limited battery power due to limited energy in the nodes. In this paper they have discussed the solutions to overcome the problem of limited battery power due to the problem of energy constraint. This concept is applied to DSR protocol that works on a reactive approach and makes use of alternate paths by satisfying a set of energy and distance based threshold area. So we can achieve the improvement in the lifetime of the entire network, raise the success rate of packet delivery by preventing nodes from dying out due to energy failure, a new protocol can be developed on the concept which is energy aware and location aware algorithm for MANET.

The paper [8] aims to compare performance of three routing protocols for Mobile Ad-Hoc networks (MANET's). The performance of these routing protocols is analyzed by five metrics: delay, network load, throughput, jitter, and mean opinion score. Proactive protocol OLSR outperforms in terms of throughput jitters and gets the same low delay as OLSR. MANET is an independent system which consists of a set of mobile nodes which can be implemented by using various techniques like Bluetooth or WLAN.

In paper [9] comparison between performance of Ad hoc On Demand Distance Vector (AODV) and Dynamic Source Routing (DSR) is done. There are three processes involved which are route discovery process, route message generation and route maintenance process.

Battery capacity is an important factor that decides the network lifetime. If any node is dying out of low battery capacity then as a consequence there will be dropping of packets. So, it is vital to protect the node from becoming unstable due to reduction in remaining battery capacity. Paper [12] proposes a self-management scheme where the node automatically manages its energy consumption thereby saving its battery capacity until its recharge by continuous 'unstable node' tracking method at an optimum threshold battery capacity value. The novel 'unstable node' tracking method is devised exclusively for Node Transition Probability (NTP) based routing environment and the same technique can be carried over to any protocol. The basic idea behind NTP based routing is to assess the stability of neighbors by initiating beacons and computing the routing table.

As the mobile ad-hoc network nodes are generally used to provide energy by the battery, it is a limited energy system. At the same time, as the mobile nodes are improving performance, the demand for energy has also been enhanced. To prolong the lifetime of routing, it is important to select the nodes with sufficient energy in routing discovery phase. Hence, Energy-based QoS Routing Protocol (EQRP) is proposed [14].

Paper [17] presents a number of routing protocols for MANET, which are broadly categorized as proactive and reactive. Proactive routing protocols tend to provide lower latency than that of the on-demand protocols, because they try to maintain routes to all the nodes in the network all the time. On the other hand, though reactive protocols discover routes only when they are needed, they may still generate a huge amount of traffic when the network changes frequently.

III. PROPOSED METHODOLOGY

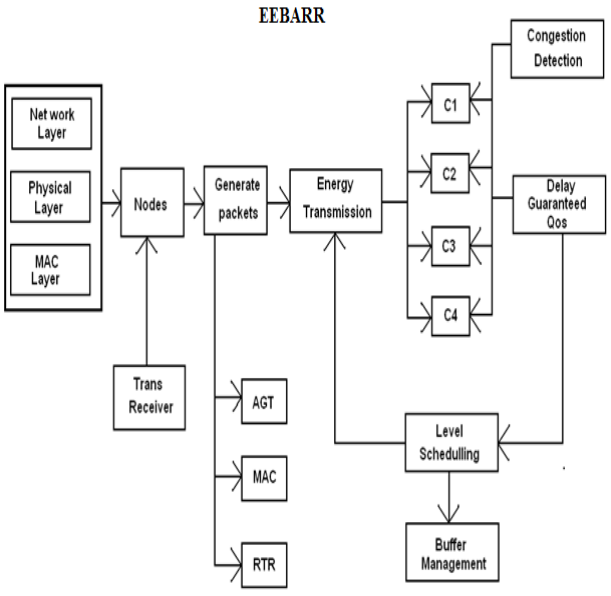

Figure 2: Block Diagram

The nodes in the network receive information from various layers such as Network Layer, Physical Layer, MAC Layer. The nodes then generate the packets which are to be transmitted from the source to destination. To generate the packets, different protocols are used by the nodes such as MAC Protocol for MAC Layer and AGT for Transport Layer and RTR routing protocol. After the packets are generated, the packets need to be transmitted from source to destination. Before transmission, the energy status of each node is checked so that the path in which minimum energy is consumed is selected and the packets are transmitted to the destination.

Level scheduling and buffer management:

Level Scheduling: In wireless sensor networks that consist of a large number of low-power, short-lived, unreliable sensors, one of the main design challenges is to obtain long system lifetime, as well as maintain sufficient sensing coverage and reliability. We propose a node-scheduling scheme, which can reduce system overall energy consumption, therefore increasing system lifetime, by turning off some redundant nodes. Different level scheduling algorithms are used which provides the energy status of each node so that the nodes that consume minimum energy can be chosen to transmit the packets from source to destination.

Buffer Management: Buffer Management policy is used to mitigate the packet losses.

Clusters: A cluster is a group of servers and other resources that act like a single system and enable high availability and, in some cases, load balancing and parallel processing.

Cluster Head: It is a senor node, which is responsible for collecting data from member nodes inside the cluster. It is also responsible for aggregating and delivering data to base station. The Cluster Head usually rotates between the nodes in the cluster.

IV. RESULTS

Table 1: Typical simulation parameters for EEBARR protocol.

Simulation Parameters	Parameter values
Simulator Used	NS : 2.35
Number of Nodes	100
Packet size	812
MAC type	MAC : 802.11
Area of Simulation	1986x600
Routing Protocol	EEBARR
Energy in joules	1000
Max. Packet in Queue	1000
Type of Channel Used	Wireless
Antenna Type	Omni
Type of Link Layer	LL
Time of Simulation	30

The above table 1, shows the simulation parameters considered for EEBARR routing protocol, which will give the description of packet size, number of nodes, energy, channel type, simulation time and so on.

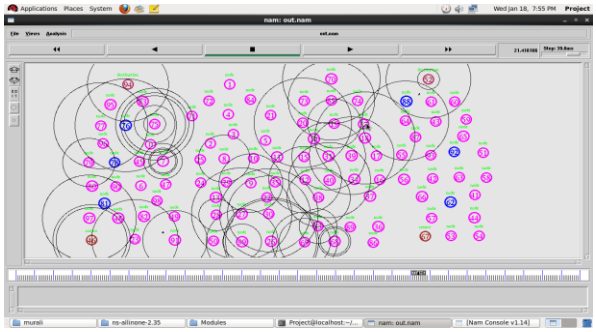

Figure 3:

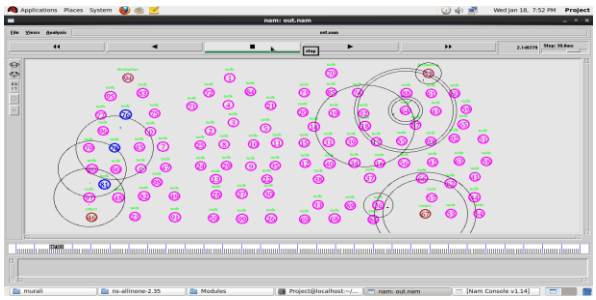

Figure 4:

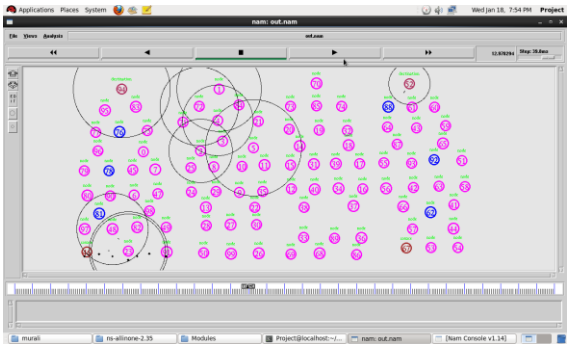

Figure 5:

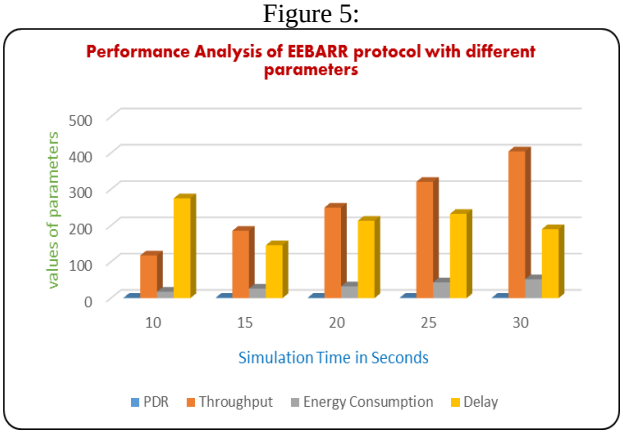

Figure 6: Performance Analysis of EEBARR Protocol with different parameters

Table 1

	10	15	20	25	30
PDR	0.8076	0.8117	0.8	0.8118	0.8455
Throughput	117.37	185.48	249.38	320.6	404.24
Energy Consumption	17.6359	26.3532	32.5016	43.4732	52.092
Delay	275.079	145.516	213.118	231.938	190.088

The performance analysis of EEBARR rotuing protocol with different parameters is shown in above figure 4.4. From graph, the parameters PDR ,Throughput, Energy Consumption and Delay are evaualted with 100 nodes in network. The Y-axis represents the values of parameters and X-axis represent the simulation time in seconds.

V. CONCLUSION

The proposed novel protocol called ENHANCED ENERGY BUFFER AWARE RELIABLE ROUTING (EEBARR) in Wireless Sensor Networks with more number of nodes to transmit the packets from source to destination improves the packet transmission, balances the energy and uses buffer management policy to mitigate packet losses and analyze the performance using the parameters like Energy consumption, Throughput, Packet delivery ratio, End to End delay and Reliability.

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